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upon the abundance of the water supply. Assuming that free water was a very important agent in the origination of living matter, the development of the gametophytic stage of plant life is shown to be dependent upon the same factor. As aridity was encountered over extended land areas, the stress thus produced led to the development of the sporophyte with its vascular system and finally its seed habit. The earlier geological strata from arid areas contain no plant fossils, because at that period vegetation was characterized by the predominance of plants with separate gametophytes. Cycads and Bennettitales were the first plants to show xerophytic structures, and from their beginning the history of desert forms may be traced. Aridity, causing the reduction of surface area and the thickening of tissues, has evolved spinose and switchlike forms; while in the regions of most extreme aridity this evolutionary development has gone much farther, with the development of remarkable storage structures in leaf and stem organs. These succulent xerophytes represent "the highest degree of differentiation in seed plants, and are found most abundantly in the very arid regions of the Karoo in South Africa, in the deserts of Brazil and Chili, in the arid regions of southern Mexico, and in the Sonoran and Chihuahuan deserts.—GEO. D. FULLER.

Algae in the laboratory.—Teachers will be interested in the practical methods which have made NIEUWLAND²⁵ so successful in growing algae in the laboratory. Large aquaria are not necessary, the best results often being obtained with gallon or two-gallon jars. The commonest mistake is to change the water, even the single change usually involved in bringing algae from the field to the laboratory often being disastrous. It is safer to bring the water in which the plants are growing. When necessary to renew the water, not more than one-fifth the volume should be added, and tap water should be allowed to run for a moment to avoid the introduction of undesirable salts. Bacterial decomposition is best prevented by introducing only a small amount of material, not more than one cubic inch to the gallon. As the material grows, the increasing amount can be accommodated because of the developing adaptation to the environment. A few plants of *Chara* are often desirable, since they prevent the water from becoming too hard, and a little *Utricularia* will rid the culture of undesirable animal life. When the algae disappear, the culture should not be thrown out, for the forms usually reappear after a time. Mud and sticks from spots where algae have been noticed may be brought into the laboratory in midwinter and soon yield vigorous cultures. Detailed directions are given for securing and keeping many of the most desirable laboratory types.—CHARLES J. CHAMBERLAIN.

A new maize from China.—The Department of Agriculture has been investigating a new type of corn received from near Shanghai, China, in March 1906,

²⁵ NIEUWLAND, J. A., Hints on collecting and growing algae for class work. *Midland Naturalist* 1:85-97. 1909.

and the results have just been published by COLLINS.²⁶ It is distinct from all hitherto known types in its erect and one-ranked leaf blades, in the development of its "silks" while still within the leaf sheath, and in its peculiar endosperm. The first two of these unique characters insure pollination and prevent the drying-out of the silks, the pollen being blown against the erect leaf blades and accumulating at their bases, and the silks pushing into these accumulations before they are exposed to the air. The endosperm is neither starchy nor horny, resembling the latter in location and hardness, but having the texture and optical properties of very hard wax, and hence the suggested name is "waxy endosperm." The xenia characters in hybrids showed that colored aleurone is dominant to transparent, yellow endosperm to white, and horny endosperm to waxy. This Chinese corn also raises the question as to whether maize was known in China before the discovery of America. That it is of American origin does not seem to be open to doubt, but Chinese literature of the sixteenth century refers to its introduction and widespread use, and this specialized type may have developed in China.—J. M. C.

Leaf structure of strand plants.—HARSHBERGER²⁷ has studied the leaves of twenty plants from the sandy shores of New Jersey and eleven from its salt marshes. All exhibit xerophytic structures and almost without exception have thickly cutinized epidermis. Four of the strand plants and six of the salt marsh species are succulents, while nine from the strand and three from the salt marsh have epidermal hairs. The drawings will form convenient plates of reference for students interested in these plants. It is to be regretted that they are not on a larger scale and that more attention has not been given to the differentiation of chlorophyll-bearing and mechanical tissues. The same criticism will apply to a previous paper by the same author²⁸ on the sand dune plants of Bermuda, which records observations for the leaves of seventeen plants. The author is confident that the various xerophytic leaf structures have been produced largely in response to intense illumination, exposure to strong winds, and in a few instances to the action of salt spray blown inland. He is inclined to over-emphasize the influence of light, and says "chlorenchyma is converted into two kinds of tissues, palisade and spongy parenchyma, as a direct result of the unequal illumination of the leaf surfaces."—GEO. D. FULLER.

Ferments of fungi.—PRINGSHEIM and ZEMPTEN²⁹ have applied the Buchner method of extracting enzymes from yeast cells to the extraction of sugar-splitting

²⁶ COLLINS, G. N., A new type of Indian corn from China. Bull. 161, Bureau Pl. Ind., Depart. Agric. pp. 30. pls. 2. 1909.

²⁷ HARSHBERGER, JOHN W., The comparative leaf structure of the strand plants of New Jersey. Proc. Amer. Phil. Soc. 48:72-89. pls. 2-5. 1909.

²⁸ ———, The comparative leaf structure of the sand dune plants of Bermuda. Proc. Amer. Phil. Soc. 47:97-110. pls. 1-3. 1908.

²⁹ PRINGSHEIM, H., AND ZEMPTEN, G., Studien über die Polysaccharide spaltenden Fermente in Pilzpresssäften. HOPPE-SEYLER'S Zeitschr. Physiol. Chemie 62:367-385. 1909.